Cordex™ 3.3kW System

125V High Voltage Integrated System

Cordex 125-3.3kW system

- 26.4A system capacity
- Cordex 125V – 1.1kW modular rectifiers
- AC input 208 to 240VAC
- DC output 90 to 160VDC
- Front accessible for rack or wall mounting
- Ethernet and SNMP communications
- Designed for industrial and utility applications

The Cordex 3.3kW high voltage integrated power system provides the best in efficiency and reliability meeting the power requirements for a variety of system applications. This system is specifically designed to recharge all types of stationary batteries for large utility, petrochemical and industrial uses.

The Cordex 3.3kW is a compact 7RU integrated system, with up to three Cordex 1.1kW rectifiers in a 19” shelf available for rack or wall mounting. Local and remote setup, adjustment and control is a simple single-step process via the Cordex CXC touch screen system controller or via ethernet on standard Windows Internet Explorer. Battery management and data logging are standard system features.

Cordex 3.3kW 125V High Voltage Integrated System

Intergrated System

Electrical

Input voltage:	208 to 277VAC
Phase:	1 or 3
Frequency:	45 to 66Hz
Current:	System 26.4A @ 125VD (max. 33A)
Power Factor:	>0.99 (input current)
Efficiency:	>93% (50 to 100% load)
Output Voltage:	90 to 160VDC
Current:	8.8A per module @ 125VDC, up to 3 modules per shelf
Load Regulation:	Static <+0.5%
Line Regulation:	Static <+0.1%
Transient response:	<+2% for 10 to 100% load step. 10ms recovery time.
Wide band noise:	<10mVrms <80mVp-p
Insulation:	2.5kVAC Input-Earth 3kVAC Input-Output 2kVAC Output-Earth 0.5kVAC Signals-Earth

Mechanical

Charger Enclosure:	Wall or Rack Mount
Dimensions	
inches:	12.2H x 17.1W x 11.9D
mm:	309H x 434W x 302D
Weight:	12.59kg (27.76lb)*
Enclosure:	NEMA 1 (charcoal finish)

Features

User Interface

GUI:	Use Internet Explorer browser to access embedded GUI through Ethernet port or RS-232 craft port
Display:	Full graphic LCD, 160 x 160 pixels, with backlight and contrast adjustment
Controls:	LCD touch screen with virtual alpha numeric and numeric keyboards
LED indicators:	System OK—Green Minor alarm—Yellow Major alarm—Red
Audio:	Built in speaker for alarms and popup messages
Language:	Multi language support including Chinese characters

Communication Ports

RS-232 (DB-9):	Craft port on front panel for local PC connection
CAN OUT (RJ-12 offset):	CAN communication BUSS to optional smart peripheral modules
RS-485 (RJ-12 offset):	For future service options
Ethernet (RJ-45):	10/100 Base T with half/full duplex

Alarms

Output:	6 potential free form C contacts
Input:	4 digital inputs
GFD:	Ground fault detect
SNMP:	SNMP agent provides real time system status to the network management software

Data Logging

Daily statistics:	Minimum, maximum and average on input channels, with date and time stamp Battery current, rectifier current, and AC mains voltage for last 90 days
Event log:	On all events such as alarms, power on, any change of state of the digital inputs, or other miscellaneous events
Battery log:	Battery health history on last 20 discharges, time of discharge, and battery capacity

Control Functions:	Automatic, scheduled (periodic) or manual equalize Automatically terminated equalize charge Battery current terminate equalize Dynamic charge current control Battery capacity and runtime prediction Auto or manual battery test

DC Output Panel

2 x 2 Pole, 32A breakers (10KAIC) with alarm monitoring

AC Input (not a service entrance):

Single phase:	1 x 2-pole 10KAIC (30KAIC Option)
Three phase:	1 x 3-pole delta connection 10KAIC 1 x 3-pole wye connection 10KAIC

Environmental

Temperature Range	
Operating:	-40 to 50˚C (-40 to 122˚F)
Extended:	Rectifier derated to 600W @ 65˚C (149˚F)
Humidity:	0 to 95%
Cooling:	Natural convection
Heat dissipation:	<900 BTU per hour/system

Standards

Safety:	UL 60950 3rd editions, CSA C22.2 No. 60950-00 3rd edition EN 60950 CE
EMC:	ICES-003 Class A FCC Part 15, Class A, FCC Part 68 EN 55022 Class AA (CISPR 22) EN 61000-4-2 ESD EN 61000-4-3 Radiated Immunity EN 61000-4-4 EFRT/Burst EN 61000-4-6 Conducted Immunity

*Rectifier module not included system weight

For more information visit www.argusdcpower.com

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#048-680-10 (09/2006)

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Cordex 125-1.1kW
19” Integrated Shelf System
Up to 3300W with CXC and Distribution

030-788-B2

The following documents and drawings are included in this manual to provide the necessary information required for installation, operation and fault diagnosis of the unit:

- **Warranty Policy:** 048-507-10
- **Specifications, Rectifier:** 010-579-B1
- **Specifications, Shelf w/ integrated CXC:** 030-788-B1
- **CSA/NRTL Equivalence:** 048-554-10
- **Installation and Operation Instructions:** 030-788-C0
- **Outline Drawings:** 030-788-06
- **Customer Connections:** 030-788-08
- **Factory Service Information:** 048-527-10

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WARRANTY AND REPAIR INFORMATION

Warranty Policy

Argus Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, excluding third party OEM materials (example: air conditioners, batteries), for a period of two years from the date of shipment from the factory. For third party products the OEM's warranty shall apply. The liability of Argus applies solely to repairing, replacing or issuing credit (at Argus' sole discretion) for any equipment manufactured by it and returned by the customer during the warranty period. The terms of the warranty are Ex Works (EXW) from Argus' factory service location.

Argus reserves the right to void the warranty if:

(1) identification marks or serial numbers are removed or altered in any way,
(2) invoice is unpaid, or
(3) defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.

Argus shall not be liable to the customer or other parties for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. There shall be no other obligations either expressed or implied. Argus will not honor warranties for batteries and other third party products without prior written Argus authorization.

Freight Policy

Customer is responsible for all shipping and handling charges (COD and freight collect will not be accepted without prior approval from Argus Technologies).

Terms of Payment (North America)

Payment terms are net 30 days subject to prior credit approval. All other orders require payment before shipping.

Terms of Payment (International)

Payment terms are subject to prior approval and are typically through Tele-Transfer.

Return Material Policy

Our RMA policy is designed to ensure prompt, efficient and high quality factory service. A Return Material Authorization (RMA) number must be obtained before products can be accepted for servicing by the Argus factory. For returns to an authorized service center (refer to "Authorized Service Centers" for locations), please consult the individual service center for specific return policies and instructions.

To obtain a RMA number for a factory return, customers must call the appropriate location with the product serial and model number, as well as a brief description of the problem, shipment instructions and billing details.

The original packing container should be used whenever possible. Both the shipping documents and the outside of the box must have the RMA # clearly marked and the product shipped prepaid to the Argus factory service center. Argus will endeavor to repair products within five working days of receipt. Repairs to the returned product are warranted for a period of six months. A service charge may be applied if no fault is found in the returned product. Argus will not accept products without an RMA number.

Business Hours

Argus North American office hours are 7:30 am to 5:00 pm (Pacific Standard Time) Monday to Friday.

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048-507-10-I1 Rev S (09/2007)

Specifications for Argus' Switched Mode Rectifier Cordex 125-1.1kW

Power Module Output

Voltage:	90 to 160Vdc within rated limits
Current:	8.8A @ 125Vdc nominal (11A maximum)
Maximum Power:	1100W continuous/module
Static Load Regulation:	Better than ±0.5% for any load change within rated limits
Dynamic Load Regulation:	Better than ±2% for 10% - 90% load step
Static Line Regulation:	Better than ±0.1% for any change in input voltage within rated limits
Dynamic Line Regulation:	Better than ±1% for any change in input voltage within rated limits
Hold-up Time:	>10ms
Time Stability:	≤0.2% per year
Temperature Stability:	≤100ppm/°C over the operating range
Heat Dissipation:	<300BTU per hour
Electrical Noise:	<10mVrms to 100MHz (wideband) <80mVp-p to 100MHz
Acoustic Noise:	<55dBa @ 1m (3ft.) @ 30°C (86°F) [individual module] <55dBa @ 1m (3ft.) @ 30°C (86°F) [four modules]
EMI:	The unit meets requirements of EN55022 (see Standards for more EMC)
Insulation:	2.5kVac input-earth, 3kVac input-output, 2kVac output-earth, 0.5kVac signals-earth

In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class A:

> **NOTE:** *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

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Power Module Input

Voltage:	208 to 240Vac nominal
Extended Operation:	Low: 176 to 150Vac (power de-rated linearly to 75% output) High: 176 to 320Vac (de-rated power factor above 265Vac)
Frequency:	50/60Hz nominal (45 to 66Hz)
Current:	5.8 to 5A (nominal Vac) 6.9A maximum @176Vac
Power Factor:	>0.99 at nominal conditions and 50-100% load; >0.98 at nominal conditions and 30-100% load
Protection:	10kA-interrupting capacity fuses in active and neutral lines
Efficiency:	>93% at nominal conditions and 50-100% load
Inrush Current:	≤ full load steady state current of the rectifier within rated limits
Start-up Ready Time:	<5 seconds (excluding soft start) to complete inrush limit routine and ac measurement (for OK signal)
Start-up Delay:	Programmable up to 120 seconds to enable stagger-start of multiple rectifiers and to minimize the effect on a supply source
Soft Start:	User adjustable to at least 5 seconds (not including start-up delay time) and is determined by output current limit ramp-up
T.H.D. (Current):	<5% at 100% load
Input Transient Suppression:	Meets ANSI/IEEE C62.41 Category B3
Input Leakage Current:	<3.5mA @ 265Vac 60Hz

Environmental

Temperature	
Operating:	-40 to +50°C (-40 to 122°F)
Extended:	600W @ +65°C (149°F)
Storage:	-50 to +85°C (-58 to 185°F)
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +4000m; derate @ -4°C/1000m above sea level (-1640 feet to 13124 feet; derate @ -7.2°F/3281 feet above sea level)

Miscellaneous

MTBF:	>400,000 hours
Dimensions:	177mm H x 71mm W x 250mm D (excluding connector) [6.9" H x 2.8" W x 9.8" D]
Weight:	2.9 kg (6.4 lb.)

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Referenced Standards

EN 300 386-2	EMC and ERM; Telecommunication Network Equipment
EN 55022 (CISPR 22): 1998	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement
EN 61000-3-2:2000	Harmonic Current Emissions
EN 61000-3-3:1995	Voltage Fluctuations and Flicker
EN 61000-4-2	ESD Immunity
EN 61000-4-3	Radiated Electromagnetic Immunity
EN 61000-4-4	Electrical Fast Transient/Burst Immunity
EN 61000-4-5	Power Line Surge Immunity
EN 61000-4-6	Conducted Electromagnetic Immunity
EN 61000-4-11	Voltage Dips, Short Interruptions and Variations
ETS 300 019-1-1	Environmental Conditions; Storage
ETS 300 019-1-2	Environmental Conditions; Transportation
ETS 300 132-2	Power Supply Interface at the Input to Telecommunications Equipment; Operated by Direct Current (DC)
ETS 300 753	Acoustic Noise Emissions
IEC 60950	Safety of Information Technology Equipment, Including Electrical Business Equipment (UL/CSA 60950)

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.
Specifications are subject to change without notice.

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Specifications for Argus' Cordex 125-1100W 19" Integrated Shelf System

Basic Unit, Shelf

Maximum Output Current:	33A @100V
Maximum Output Voltage:	160Vdc

Mechanical

Dimensions:	309mm H x 434mm W x 302mm D (rectifier front panel 18mm D) [12.2" H x 17.1" W x 11.9" D (rectifier front panel 0.71" D)]
Mounting:	19" rack or wall mount
Weight:	14.38 kg (31.71 lb.)

Connections

AC Input:	Optional DIN rail supplementary protectors (#18 to #4) or barrier style terminal blocks
Recommended Feeder Breaker	
Single Phase:	2-pole, 25A, #10AWG
Three Phase:	3-pole, 15A, #14AWG delta connection 3-pole, 10A, #14AWG wye connection
Communications:	CAN (bus) out RJ-12 offset, craft port DB-9, Ethernet RJ-45, RS-485 RJ-12 offset
DC Output:	Optional DIN rail output breakers (#18 to #2) or barrier style terminal blocks
Signal wiring:	Terminal blocks 0.129 to 6mm^2 (#26 to #10AWG)

Safety

EN	60950
UL	60950-1:2002
CSA	60950-1-03

Basic Unit, CXC (for 1.1kW integrated shelf system)

Input Voltage:	90 to 300Vdc within rated limits
MTBF:	472,000 @ 25°C (77°F)
EMC:	The unit meets requirements of: ICES-003 Class A EN 55022 Class A (CISPR 22) EN 61000-4-2 ESD EN 61000-4-3 Radiated Immunity EN 61000-4-4 EFT /Burst EN 61000-4-6 Conducted Immunity FCC Part 15 Class A, FCC Part 68
Ground Fault Detection:	0 – 10mA

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In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class A:

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Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

Environmental

Operating Temperature:	0 to 65°C standard @ 3000m derate to 55°C @ 4000m (32 to 149°F derate to 131°F @ 13124ft) [Optional -40°C]
Storage Temperature:	-20 to 70°C standard (-4 to 158°F) -40 to 80°C optional (-40 to 176°F)
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +4000m (-1640 to 13124 ft)

CXC Specifications

CPU:	Coldfire
RAM:	8MB
Flash:	4MB standard
Display:	160 x 160 pixel grayscale LCD
Front Panel Controls:	Reset button and touch panel (display and input device)
LED's:	System OK (Green) Power System Minor Alarm (Yellow) Power System Major Alarm / Controller Fail (Red)
Audio:	Built-in speaker for alarm and popup message tones
Mounting:	Integrated with shelf system
Analog Inputs:	1 DC voltage (internal; factory wired)
Ground Fault Detect Alarms:	1
Digital Inputs:	4 (1 used for output breaker alarm)
Relay Outputs:	6 Form C, 220VDC 0.4A maximum

The above information is valid at the time of publication. Consult factory for up-to-date ordering information. Specifications are subject to change without notice.

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CSA/NRTL — MARKS — BACKGROUND

What are the CSA and NRTL?

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

Federal Register #: 59:40602 - 40609 [08/09/1994]
Federal Register #: 64:60240 - 60241 [11/04/1999]
Federal Register #: 66:35271 - 35278 [07/03/2001]

C US NRTL/C

The product on which either of these marks appear has been certified by CSA as meeting applicable Canada/US standards.

When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Argus rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 950 and UL 1950, or CSA/UL 60950.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

c UL US

The product on which this mark appears has been certified by UL as meeting applicable Canada/US standards.

Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

What are NRTLs and what do they do?

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

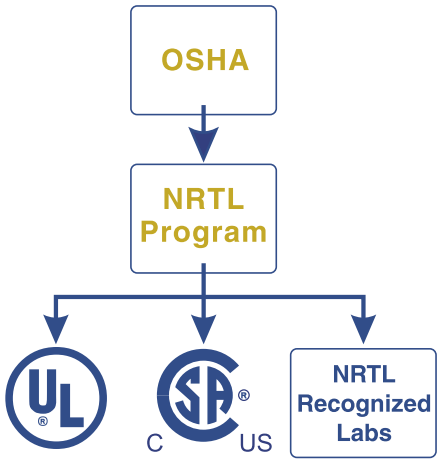
The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

When was the NRTL started and who governs it?

In 1983, in a suit brought on by an independent testing laboratory, OSHA was court ordered to remove specific references to UL (Underwriters Laboratories) and FMRC (Factory Mutual Research Corporation) from its regulations.

In 1988, OSHA revised its regulations to remove those references and the NRTL program was established.

The NRTL Program is both national and international in scope with foreign labs permitted.



References:
Information in this document has been developed from the official websites of the respective organizations.
(1) www.csa-international.org
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

1. Please read this manual prior to use to become familiar with the product's numerous features and operating procedures. To obtain a maximum degree of safety, follow the sequences as outlined.

2. This manual provides warnings and special notes for the user:
    a. Points that are vital to the proper operation of the product or the safety of the operator are indicated by the heading: **WARNING**.

    b. A notation that is in ***Bold Italic*** typeface covers points that are important to the performance or ease of use of the product.

3. Before using the product, read all instructions and cautionary markings on the product and any equipment connected to the product.

4. Do not expose the product to rain or snow; install only in a clean, dry environment.

5. **CAUTION** – Unless otherwise noted, use of an attachment not recommended or sold by the product manufacturer may result in a risk of fire, electric shock, or injury to persons.

6. **CAUTION** – Do not operate the product if it has received a sharp blow, it has been dropped, or otherwise damaged in any way – return it to a qualified service center for repair.

7. **CAUTION** – Do not disassemble the product – call our qualified service centers for servicing. Incorrect reassembling may result in a risk of electrical shock or fire.

8. **WARNING** – The output voltages of the product are hazardous. Extreme caution should be maintained when servicing or touching conductive components connected to the product's output.

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1 Introduction

1.1 Scope of the Manual

This instruction manual explains the installation, interconnection, and operation of Argus Technologies' Cordex 125-1100W 19" shelf system with up to 3300W output power and integrated controller and distribution.

NOTE: *To aid the user with installation, frequent reference is made to drawings located at the rear of the manual.*

1.2 Product Overview

A complete Cordex rectifier system consists of a controller with one or more power modules in a common shelf enclosure. The shelf has connections for AC inputs, DC output, and system communications.

Cordex rectifier modules use a high frequency, switched mode conversion technique to provide a fully regulated and isolated DC output from the AC mains. The rectifier input is wide range to allow use on 208/220/240 50/60 Hz electrical service. Rectifier power modules are "hot swappable" meaning they can be inserted or removed from the shelf without cutting power to or from the system or the load. Additional power modules can be included with the system at the time of ordering or added after the shelf has been installed.

This rectifier system has an Argus Cordex system controller (CXC) built into the shelf. The CXC allows the user to configure, monitor and control the entire power system and ancillary components from a touch screen display similar to that used in a Personal Digital Assistant (PDA). Other features of the controller include auto equalization, remote access, dial out on alarm, battery diagnostics, as well as Web server and Simple Network Management Protocol (SNMP) support for configuration and monitoring.
Details of controller operation are provided in the current version software manual.

The distribution component utilizes a number of breakers as outlined in the ordering options.

Figure 1–Cordex 125-1100W 19" integrated shelf system with CXC and distribution

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1.3 Part Numbers and List Options

This product is available to order under the following part numbers and list options:

Description	Part Number/List Option
Cordex 125-1100W 19” shelf **with integrated CXC** for systems up to 3300W	030-788-20
[equipped to receive three CXRC 125-1100W rectifiers]	*List 0
Charcoal finish with white (contrasting) silkscreen	*List 56
Input (ac) breaker, 13A, 3-pole, 208-240Vac, 3-phase Delta, no neutral required	List 83
Input (ac) breaker, 10A, 3-pole, 360-415Vac, 3-phase Wye, neutral required	List 84
Input (ac) breaker, 25A, 2-pole, 208-240Vac, 1-phase	*List 85
Input (ac) breaker, 25A, 2-pole, 30kA, 208-240Vac, 1-phase	List 86
Rectifier blank plate	List 90
Output (dc) breaker, 32A, 2-pole	*List 132
Cordex 125-1100W rectifier power module	010-579-20
Basic module	*List 0
125Vdc output	List 3
Charcoal finish with white (contrasting) silkscreen	*List 56
185Vdc output	List 192

* Default option

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.

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2 Features

2.1 Cordex System Controller (CXC)

The Cordex CXC system controller is integrated with the rectifier system shelf and brings advanced monitoring technology to the Cordex series of rectifiers. This compact system controller is designed for seamless operation and set up of Argus power systems and is equipped with the complete range of Cordex software features, including the following:

- Designed to communicate directly with Cordex rectifiers
- Battery performance diagnostics
- Provides local and remote communications
- User definable alarms
- Daily logging of power system events and system statistics.

Behind the CXC's front panel lies the main controller motherboard, which contains a microprocessor, memory, as well as numerous other electronic components.

The CXC includes a web server providing easy set up and monitoring using an Internet connection with the standard Microsoft® Windows Internet Explorer browser.

The data logging feature allows the user to capture data from multiple inputs, for AC/DC voltages, load/battery current, cell voltages & temperatures (automatically for up to 16 user defined logs). Typical applications of the CXC logging include power system details, thermal performance of outdoor enclosures, battery cell specifics, or mains variations captured by an AC voltage watchdog.

A built-in audio speaker sounds an intermittent tone during active alarms.

The input/output (I/O) board houses a series of terminal connections; located behind the front panel of the distribution section.

2.2 CXC Front Panel

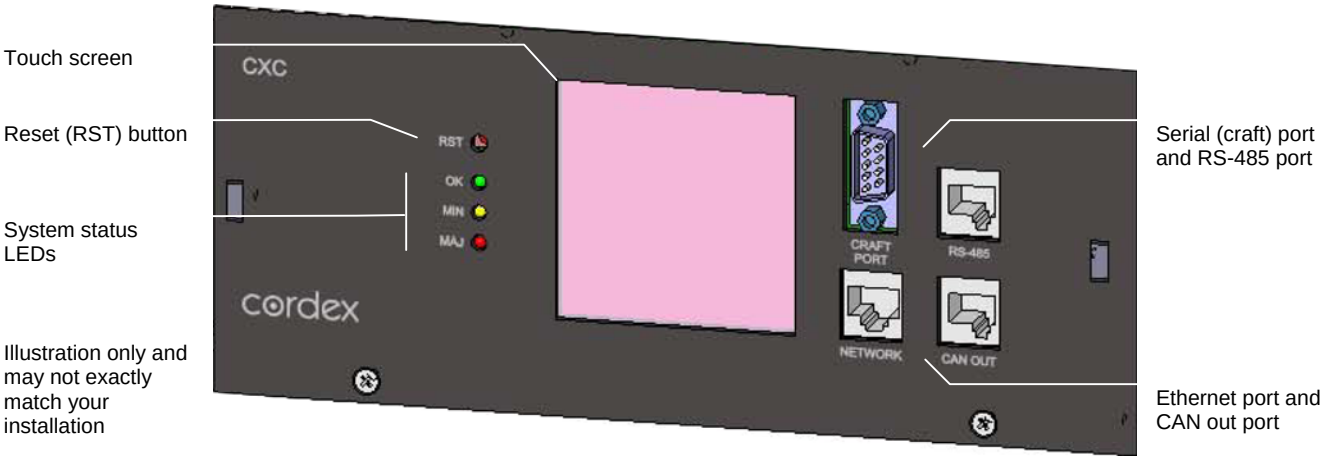

Figure 2–Illustration of CXC front panel

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2.2.1 Touch Screen

Located on the front panel is a 160 x 160-pixel graphical LCD with touch screen similar to those used in PDAs. This graphical user interface (GUI) allows the operator to interact with screen selectable items using a fingertip.

Figure 3–Sample screen of CXC graphical user interface

2.2.2 LEDs

The CXC has three LEDs located on the front panel. These are used to display the alarm status of the power system, CXC progress and status during startup, file transfers and lamp tests.

2.2.2.1 Alarm Conditions

The CXC illuminates the LED that corresponds to the system alarm status. The following show the corresponding alarm status for each LED color:

Green – OK, no alarms present
Yellow – Minor alarm is present (no major alarms)
Red – Major alarm is present.

Only one LED is illuminated at a time during alarm conditions.

2.2.2.2 Progress and Status Indication

The LEDs are also used in the following situations:

Base unit validation – all three LEDs are on at the same time.
File transfer – when recovering from invalid firmware application – the red LED is illuminated.
Lamp Test – all three LEDs flash on and off at the same time for 2 seconds.

2.2.3 Reset

A reset button is located on the front panel for restarting the CXC's microprocessor. It takes approximately 15 seconds before the display reappears after pressing the reset button.

NOTE: *Refer also to the software manual – always select the shutdown menu item before pressing the reset button.*

2.2.4 Ethernet Port

The Ethernet port is designed for CXC connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack (Figure 2) and a standard network cable.

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

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2.2.5 Serial (Craft) Port

Local access to the CXC is possible through a front panel craft port; using a null modem cable. The communication protocol supports a web interface (via Microsoft® Internet Explorer 6 or greater). The remote screen display is an enhanced version of the CXC's front panel display.

2.2.6 RS-485 Serial Port

An RS-485 serial port is provided for communications with a variety of system components including, but not limited to, Argus' Pathfinder series high capacity rectifiers. Utilizing a RJ-type connector, this port is located next to the craft port on the CXC front panel.

2.2.7 CAN Serial Port

A CAN serial port, for communications with Argus' Cordex rectifiers and other CAN-enabled equipment, is located below the RS-485 port on the CXC front panel.

2.3 CXC Analog Input Channels

The CXC has one analog input channel for voltage. See Section 5.11.1.

2.3.1 Voltage Input

One voltage input channel, V2, provides monitoring of charge (battery) voltage. The CXC software is pre-configured to monitor V2 for battery voltage. V2 is used as the system reference for rectifier float voltage, low voltage disconnect (LVD), system high voltage alarm, and system low voltage alarm.

2.3.2 Ground Fault Detect (GFD)

V2 is also used for GFD (internally connected circuit). Ground fault is detected when either terminal of V2 (system voltage that is normally connected to the battery string) shorts to earth ground either directly or through some conductive means. The GFD circuit will detect a fault current range of ±10mA. The resolution is 1mA.

The GFD will trip an alarm if the fault current exceeds the user configurable Trip Value under Configuration menu of Alarms/Configure Alarms/Miscellaneous Alarms/GFD. The default setting is ±5mA. The GFD alarm may also be disabled.

As with any analog input, the GFD can also be calibrated as required. See Analog Calibration menu in the CXC software manual.

2.4 CXC Digital Input Channels

The CXC can accommodate up to four digital input channels. See Section 5.11.2.

NOTE: *Each channel may be set by closing (shorting) or opening the inputs with a voltage free contact to achieve the appropriate condition. This is differs from the digital inputs on other Cordex controllers which require a zero or system voltage potential at the input to activate or deactivate the appropriate condition.*

These channels can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment. Some of these channels are pre-assigned to monitor specific signals. *See the Software manual for more information.*

2.5 CXC Alarm and Control Output Relays

The CXC contains six Form C digital alarm output relays to extend alarms and control external apparatus. Each internally generated alarm or control signal may be mapped to any one of the relays, or, several signals may be mapped to just one relay or none at all. See Section 5.11.3.

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2.6 Network Connection and Remote Communications via CXC

The Cordex system can be set up, monitored and tested via ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface. All alarming and control of Cordex rectifiers is accomplished with a CXC via a CAN bus.

A step-by-step connection wizard – provided to establish remote communications with your CXC – is available via the Argus website (www.argusdcpower.com).

When connected to the CXC remotely, an online help guide is provided to supplement the software manual with regard to the features of the web interface.

2.7 Rectifier Front Panel

Figure 4–Cordex 125-1100W rectifier front panel

2.7.1 LEDs

The front panel LEDs provide rectifier status summary and help to locate a specific module under CXC control.

2.7.1.1 AC

The top LED (green) is on when AC is within valid range. The LED will flash (~2Hz) when AC is outside the nominal range – ***AC voltage is invalid if the AC Mains Low or AC Mains High alarm is active***. The LED turns off when AC has failed (or no AC power is present).

2.7.1.2 DC

The middle LED (green) is on when the rectifier is delivering power to the load. The LED will flash when communication is lost. The LED turns off when the rectifier is off; e.g., when commanded via the CXC.

2.7.1.3 ALM (Alarm)

The bottom LED (red) is on continuously in the event of an active Module Fail alarm. The LED will flash (~2Hz) when a minor alarm is detected. The LED remains off in the absence of an

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alarm. If the unit output is not connected to a battery or parallel rectifier, the LED will extinguish if no AC power is present.

2.7.1.4 LED Activity During Software Upload

When a rectifier software upload is in progress, the LEDs will behave in a distinctly different way to indicate new rectifier software is being transferred from the CXC.

When a rectifier data transfer is in progress, all three LEDs will flash in a sequence lasting 1.5 seconds. When the last LED is lit, the sequence is repeated beginning at the first LED.

2.7.1.5 LED Activity During 'Locate Module' Command from CXC

When the 'locate module' command has been received from the CXC, the LEDs will behave in another distinct fashion so that the rectifier is easier to visually identify among adjacent rectifiers.

This state is entered when commanded via the CXC. The LEDs will flash in a ping-pong pattern repeating every 2 seconds.

The ping-pong pattern lights each LED sequentially. After the last LED is lit, each LED is lit in reverse sequence. When the first LED is lit, the pattern repeats. The effect makes it appear as if the light is bouncing between the first and last LED.

2.7.2 Mechanical

A thumbscrew is provided to secure the rectifier into the shelf. During normal operation the rectifier shall be locked into position. A handle (or grip) is incorporated into the front panel to facilitate the removal of the rectifier from the shelf. No special tools are required.

2.8 Rear Panel

Located on the rear panel of the rectifier is a single connector for shelf power and communications.

2.9 True Module Fail Alarm

The rectifier modules have a "true" fail alarm. This provides a true indication of the module's ability to source current. When the module's output current drops below 2.5% of the rated output a low output current condition is detected and the Module Fail detection circuit is activated. This circuit momentarily ramps up the output voltage to determine if the module will source current. If no increase in current is detected, the Module Fail alarm is activated. The module will test once every 60 seconds for the condition until current is detected. Output voltage ramping will cease upon detection of current[1]. A minimum 2.5% load is required to avoid the Ramp Test Fail alarm; this can typically be provided with the parallel system battery. Activation of this alarm could indicate a failed module or a failed load.

NOTE: *For Cordex rectifier systems without batteries (or with a very light load; below 2.5% of rated output) it is recommended that the ramp test be disabled to avoid nuisance alarms. The Ramp Test feature is enabled/disabled via the CXC menu item: Rectifiers, Configure Settings.*

2.10 Heat Dissipation

Heat dissipation of rectifiers is achieved through natural (bottom to top) convection cooling. System exhausts air through side and front vents above rectifiers.

[1] Under normal conditions, a battery connected to the output of the rectifier will draw current when the voltage ramp occurs. Therefore the rectifier fail alarm will not be generated with a battery connected.

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2.11 Over Temperature Protection

Each rectifier module is protected in the event of an excessive increase in temperature due to component failure or cooling airflow blockage. During over temperature conditions, the rectifier limits the output power as well as the output current. ***At 65°C output power and current limit are reduced to 70%.*** If temperature continues to increase, a shutdown of the rectifier is initiated. The rectifier shall restart automatically if the temperature has returned to a safe level.

2.12 Wide AC Range

A minor alarm is generated when the AC input voltage drops below 180Vac. Output power is reduced linearly below 150Vac to 40% of the rated output power. At a lower voltage the rectifier module will shut down and will not restart until the AC is greater than or equal to 150Vac.

For voltages above 276Vac, power factor and total harmonic distortion may be derated. For voltages between 277Vac and 320Vac, the rectifier may not be operational but shall not suffer any damage.

2.13 AC Inrush/Transient Suppression

The inrush current of the rectifier module is limited to less than the nominal peak line current to prevent surge on the AC line. Modules are also protected from input lightning and transient surges in accordance with IEEE/ANSI C62.41 Category B3.

2.14 Soft Start

To eliminate an instantaneous demand on the AC source, a soft start feature is employed. Soft Start, sometimes referred to as “current walk-in”, works by gradually (up to five seconds) ramping the current limit up from zero to the actual or defined customer setting. The rectifier output voltage is ramped up from the minimum voltage to the float voltage.

2.15 Start Delay

The rectifier modules are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of generators upon start up. The built-in timer delays the turn on of the module depending on the value selected (up to 120 seconds) via the CXC. A minimum one-second delay is preset to allow charging of the input capacitors.

2.16 Current Limit/Short Circuit Protection

The current limit function determines the maximum output current limit of the rectifier module, regardless of output voltage or power. Maximum output current is limited to a constant value down to short circuit condition. Current limiting can be used to mate the rectifier output current ampacity to the needs of the load and parallel battery to minimize excessive battery recharge current.

The rectifier will sustain a short circuit at the output terminals indefinitely. The maximum short circuit current shall not exceed 105% of the rated full load current.

2.17 Power Limiting

Each rectifier module is designed to limit power output to the module specification. This enables more current to be supplied at lower output voltages, and allows matching of output to the demand of constant power loads, normally seen with telecom equipment.

This feature may also be used for a faster recharge of flooded batteries paralleled with the load.

NOTE: *Current limiting overrides the power-limiting feature.*

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2.18 High Voltage Shutdown (HVSD)

This feature provides protection to the load from over voltage conditions originating from the rectifiers. It operates by shutting down the offending rectifier module when a high output voltage condition occurs. Indication is through the red Alarm (Module Fail) LED. Modules will restart automatically; however, if more than three over voltage conditions occur in one minute, the module will latch off and remain shut down until it is reset via the CXC.

2.19 Battery Eliminator Operation

Rectifier modules maintain all specifications (except where indicated) with or without a battery attached in parallel to the output; however, if a battery or another module supplying DC voltage in parallel is not present, there will be no monitoring or control activity if there is an AC power failure or input fuse failure.

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3 Inspection

3.1 Packing Materials

All Argus products are shipped in rugged, double walled boxes and suspended via solid inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to International Safe Transit Association standards.

Products are also packaged with Cortex. This plastic wrap contains a corrosive-inhibitor that protects the product from corrosion for up to two years.

3.1.1 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

NOTE: *Argus Technologies is not responsible for damage caused by the improper packaging of returned products.*

3.2 Check for Damage

Prior to unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact Argus Technologies for advice on the impact of any damage.

Verify that you have all the necessary parts per your order for proper assembly.

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4 Installation

This chapter is provided for qualified personnel to install the product, which shall be mounted in a clean and dry environment.

NOTE: *To aid the user with installation, frequent reference is made to drawings located at the rear of the manual.*

4.1 Safety Precautions

WARNING
Hazardous voltages are present at the input of power systems. The DC output from the rectifiers is classified as hazardous voltage and has a high short circuit current capacity that may cause severe burns and electrical arcing.

Before working with any live battery or power system/distribution center, follow these precautions:

- Remove all metallic jewelry; e.g., watches, rings, metal rimmed glasses, necklaces.
- Wear safety glasses with side shields (and prescription lenses if necessary) at all times during installation.

Metallic tools must be insulated.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, OSHA, and local fire codes.

4.2 Shelf Preparation/Mounting

The shelf has been designed for mounting on a wall or in a standard 19” rack. See drawing 030-788-06.

NOTE: *The shelf shall be mounted in a clean and dry environment. Allow at least 1.75” of free space above and below the unit for unrestricted cooling airflow. 3.5” (2RU) is recommended.*

CAUTION
If the shelf is not equipped with the AC or DC breaker options, then the shelf should be wired (Section 5) prior to wall mounting as it will be necessary to remove the back cover to access connection points.

4.2.1 Wall Mount

The shelf may be wall-mounted using a 3/4" plywood backing plate measuring 16” x 24”. Secure the backing plate centered on wall studs using four customer-supplied 1/2" x 4” lag bolts and 1/2" flat and spring lock washers. Secure the shelf to the backing plate using four 1/4" x1” lag bolts with 1/4" flat and spring lock washers.

4.2.2 Rack Mount

Mounting brackets accommodate either 1” or 1-3/4” rack spacing. The shelf should be mounted to the rack using at least two #12 – 24 x 1/2” screws in each bracket. Philips-type screws and screwdriver should be used to eliminate the possibility of slippage and scratching of the unit’s exterior. Washers (such as internal tooth) or special screws that are designed to cut through the painted surface should be used to ensure a good chassis ground.

4.3 Module Insertion/Removal

Insert by placing the module on the shelf bottom and sliding the module into the rear connector (inside of the shelf). Apply pressure on the module handle to engage the rear connector in the shelf receptacle.

Tighten the screw on the bottom of the faceplate to secure the module to the shelf.

NOTE: *Do not force a module into position if it does not seat properly. All modules are keyed to ensure that the correct module (polarity/voltage) type is used.*

To remove a module, loosen the screw on the bottom of the faceplate. Grasp handle and pull out, sliding the module away from the rear connector and out of the shelf.

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5 Wiring and Connections

This chapter provides cabling details and notes on cable sizing for DC applications with respect to the shelf.

NOTE: *Refer also to foldout drawings located at the rear of the manual.*

5.1 Safety Precautions

WARNING
Hazardous AC voltages may be present. Ensure power at the AC service panel is off before attempting work on the AC connections. Use a voltmeter to verify the absence of voltage. Clearly mark the correct polarity of the battery leads before commencing work on DC connections.

Refer to the previous (Installation) chapter for additional safety precautions.

5.2 Front Access

All wiring connections are accessible from behind the front panel of the distribution section. Turn the two front panel latches (spring-loaded) counter-clockwise to gain access to the terminal block connectors.

Terminal blocks can accommodate wire sizes per the specifications section near the front of this manual. All cables should be routed through the side access holes, bundled together with clips and clamped directly into applicable terminal blocks.

NOTE: *Connections to the CXC should comply with all local electrical codes and ordinances.*

5.3 Tools Required

Various tools are essential for product installation. Use this list as a guide:

- Slot head screwdrivers (blade sizes: 1/4”, 1/8”, 1/16”)
- Philips head screwdriver, #2 (tip size 3/16”)
- Digital voltmeter equipped with test leads
- Adjustable 125Vdc load (optional)
- Cutters and wire strippers
- Crimping tool (optional for large gauge wire)
- Socket and rachet set (Imperial measure)
- Anti-static wrist strap
- Computer (laptop) with Microsoft® Internet Explorer 6 or greater
- Crossover cable RJ-45 (for access using the Ethernet port).

5.4 Power System Chassis Ground and DC Ground Reference

WARNING
For safety reasons, ensure the system is properly bonded to the building’s ground grid.
125Vdc systems are typically floating; i.e., not connected to earth ground.

Connect the chassis ground to the site ground to ensure correct operation of the CXC and to prevent drifting floating analog (especially current) readings. The Ground Fault Detect circuit will not function properly if the chassis is not connected to the site ground.

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5.5 AC Feeder Protection/Sizing

It is recommended to use a dedicated protection feeder breaker located at the AC distribution panel to act as the disconnect device for the connected modules.

AC Feed	Circuit Breaker Exact Value to Use (A)	90 deg. C Wire Gauge to use at 30 deg. C ambient (AWG)
Single phase, 2-pole	25	10
Three phase, 3-pole	15	14, Delta connection
Three phase, 3-pole	10	14, Wye connection

Table A–Recommended AC supply configuration

5.6 AC Input Connections

CAUTION: AC input wires should be routed in flexible or rigid conduit as far away as possible from the DC power wires to minimize EMI disturbances.

If the shelf is factory-equipped with a line cord, proceed to the next section.

Refer to customer connections drawing 030-788-08.

If the shelf is not equipped with an AC breaker, then remove the rear cover to expose the AC terminal blocks; otherwise, remove the metal cover from the front of the shelf to expose the wireway for the input terminal blocks.

Attach the conduit retainers to the wireway hole(s) and route the AC cables through. Secure the wires to the AC input and chassis ground terminals as required. Tighten the cable connector to the AC cable (conduit similar).

Replace cover once all connections have been completed.

5.6.1 Single Phase

Remove the metal cover from the front of the shelf to expose the input terminals, L1 and L2, on the DIN rail AC breaker and the ground DIN rail terminal block.

5.6.2 Three Phase

Remove the metal cover from the front of the shelf to expose the input terminals, L1, L2 and L3, on the AC breaker and the ground DIN rail terminal block. N (neutral, terminal block) will also be used for the option selected when a Wye source is provided.

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5.7 Calculating Output Wire Size Requirements

Wire size is calculated by first determining the appropriate maximum voltage drop requirement. Using the formula below calculate the CMA wire size requirement. Determine the size and number of conductors required to satisfy the CMA requirement.

CMA = (A x LF x K) / AVD, where:

CMA = Cross section of wire in circular MIL area
A = Ultimate drain in amps
LF = Conductor loop feet
K = 11.1 constant factor for commercial (TW type) copper wire
AVD = Allowable voltage drop

Check again that the ampacity rating of the cable meets the requirement for the installation application. Consult local electrical codes (NEC, CEC, etc.) for guidelines. If required, increase the size of the cable to meet the code.

5.8 DC Output Connections

WARNING
Leave cables or bus bars disconnected at battery and verify output polarity using a voltmeter. Make battery connections only after all other wiring is completed.

DC output wire shall be UL approved XHHW or RHH/RHW (for Canadian users, RW90 Type). Control and sense wires shall be UL approved Style 1015 (for Canadian users, TEW type).

Refer to customer connections drawing 030-788-08.

If the shelf is not equipped with DC breakers, then remove the rear cover to expose the DC terminal blocks; otherwise, remove the metal cover from the front of the shelf to expose the output terminals on the DC breakers.

Route output cables through the side of the shelf and secure the positive and negative to the shelf output post of the correct polarity; i.e., +Vcable to +Vpost.

Replace cover once all connections have been completed.

5.9 Rectifier Connections

5.9.1 CAN Out Serial Port

The front panel CAN Out serial port or “CAN bus” provides for communications with Argus’ Cordex rectifiers and other CAN-enabled equipment (nodes) on the same system.

Daisy-chain from node to node (CAN OUT of one node to CAN IN of another) as necessary and ensure that only the last node is terminated.

5.9.2 RS-485 Serial Port

The RS-485 serial port provides a secondary connection for converters and rectifiers (such as Pathfinder) that do not support the CAN bus interface.

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5.10 Network Connection and Remote Communications via CXC

The Cordex system can be set up, monitored and tested via ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface.

5.10.1 Ethernet Port for Network Connection (Standard Network Cable)

The Ethernet port is designed for CXC connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack.

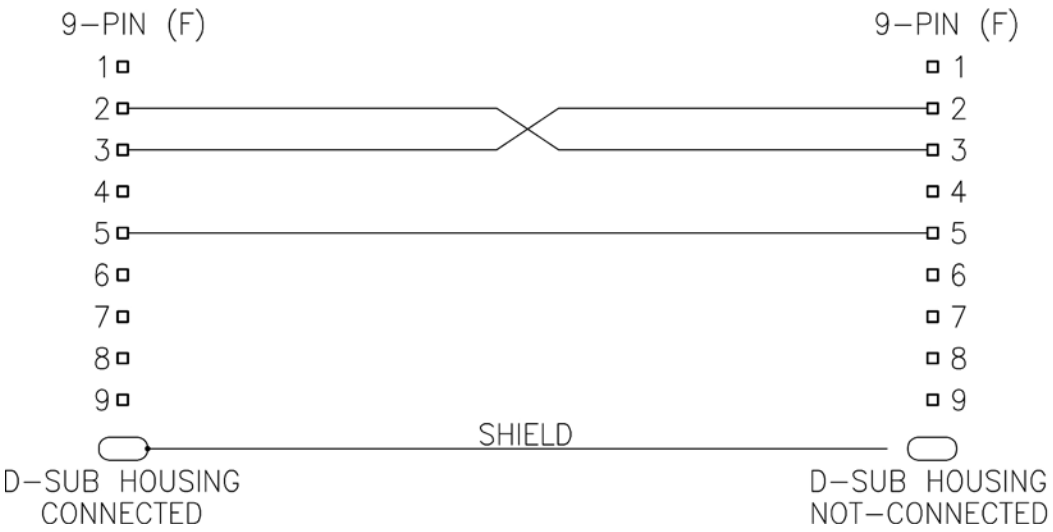
Connect to the Cordex shelf using a standard network cable. Pinouts are shown in drawing 030-788-08.

5.10.2 Ethernet Port for Local Connection (Crossover Cable)

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

5.10.3 Serial (Craft) Port for Local Connection (Null Modem Cable)

Local access to the CXC is possible through the front panel craft port connection using a null modem cable:



PIN No.	SIGNAL
1	DCD
2	RD
3	TD
4	DTR
5	SIG GND
6	DSR
7	RTS
8	CTS
9	N/C

Figure 5–NULL modem pinouts

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5.11 Signal Wiring Connections

For terminal block connections, the recommended wire sizes are 0.129 to 6mm^2 (#26 to #10 AWG) for the temperature range of 0 to 50 deg. C (as per UL/CSA).

CAUTION: to reduce risk of fire, use only 0.129mm^2 (#26 AWG) or larger wire.

Terminal	Description	Default Name	Signal Type	Range
1, 2, 3; K1*	Alarm Output 1	**LVD1**	NC/COM/NO	220Vdc, 0.4A
4, 5, 6; K2*	Alarm Output 2	**LVD2**	NC/COM/NO	220Vdc, 0.4A
7, 8, 9; K3*	Alarm Output 3	**LVD3**	NC/COM/NO	220Vdc, 0.4A
10, 11, 12; K4*	Alarm Output 4	**Sys**tem **Min**or	NC/COM/NO	220Vdc, 0.4A
13, 14, 15; K5*	Alarm Output 5	**Sys**tem **Maj**or	NC/COM/NO	220Vdc, 0.4A
16, 17, 18; K6*	Alarm Output 6	**AC** Mains **Hi**gh-**Low**	NC/COM/NO	220Vdc, 0.4A
19, 20; D1**	Digital Input 1 (internal)	**Dist**ribution **Fuse** (Alarm)	N/A	Short or open
21, 22; D2**	Digital Input 2	**Batt**ery **Fuse** (Alarm)	N/A	Short or open
23, 24; D3**	Digital Input 3	**LVD Man**ual **In**	N/A	Short or open
25, 26; D4**	Digital Input 4	**LVD Man**ual **Out**	N/A	Short or open
TB3-1,2; V2***	Voltage Input 2 (internal)	Battery Voltage	Pos (+) / Neg (-)	0—300Vdc

Table B–Wiring connections for CXC

* NO and NC Form C contacts available. Can be configured to de-energize on alarm (DOA) or energize on alarm (EOA).
** See Table C for definitions of impedance levels.
*** Wired internally; Bipolar (Voltage Input) is ±150VDC, Unipolar Voltage (Input) is 0—300VDC.

NOTE: *To aid the user with installation, frequent reference is made to drawings located at the rear of this manual. Custom configurations may be detailed within the Argus power system documentation package.*

The input cables should be bundled together and routed through the entry holes of the shelf, if applicable.

5.11.1 Analog Inputs for CXC

WARNING
Ensure the correct polarity is used for all input cable terminations.

The analog input channels are used to monitor various types of electrical signals. Some of the analog channels are reserved for specific signals, while others are designated as general-purpose inputs, which accommodate various types of analog signals.

Bundle the input cables together and route through the entry holes.

NOTE: *Default configurations and terminal numbers described below have been summarized in Table B. Refer also to foldout drawings located at the rear of this manual. Custom configurations may be detailed within the Argus power system documentation package.*

5.11.1.1 Voltage

Voltage Input #2 (V2, battery voltage per CXC software) is wired internally to the rectifier output voltage of the shelf. This is used as the reference for system alarming (such as high voltage) and control (such as LVD).

CAUTION
If the V2 sense leads are disconnected from the CXC, the following will occur:

- The CXC registers the absence of DC as an invalid condition.
- The LVD will not be de-activated.
- The rectifier voltage may increase slightly, typically 1.8V (5.5V maximum).

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5.11.2 Digital Inputs for CXC

The digital input channels are used to monitor various alarm and control signals. Shorting an input with a voltage-free relay contact will activate the channel.

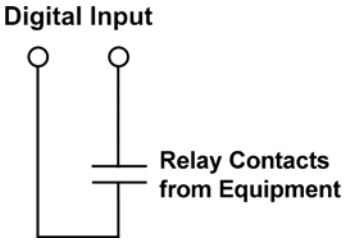

Figure 6–Showing digital input connection method

The digital input channels (terminals 19 through 26) can be programmed for “active high” or “active low.” Active high indicates “alarm on the presence of a short circuit” and active low indicates “alarm on the removal of the short circuit.”

NOTE: *See CXC Software manual for detailed instruction on programming.*

Impedance Level (Ohms) Considered As “0” (Off)	Impedance Level (Ohms) Considered As “1” (On)
> 1M	< 1

Table C–Digital input impedance level definitions

5.11.3 Alarm (Relay) Outputs

WARNING
Relays are rated at 220VDC 0.4A. Exceeding these limits may damage the relay and other circuitry in the CXC.

Terminals 1 to 18 provide 6 Form C contacts (NO, COM and NC) for extending various alarm or control signals. Each relay output can be wired for NO and/or NC operation during an alarm or control condition. See Figure 7.

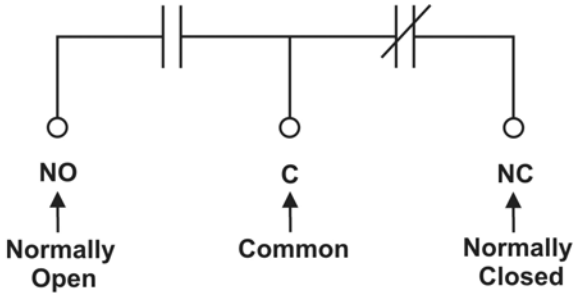

Figure 7–Showing relay connections in the de-energized state

Relays can be programmed to energize or de-energize during an alarm condition (see CXC Software manual). When the CXC reset button is pressed or power is lost, all relays de-energize.

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6 Operation

6.1 Main Rectifier States

Rectifier operation can be broken up into five main states:

1. Off,
2. Start delay,
3. Soft start,
4. Normal operation,
5. Turning off.

Each state is characterized as being distinct and necessary for the operation of the rectifier. These states are briefly described below.

6.1.1 Off State

The rectifier will be in the Off state immediately after power is applied to the rectifier or after a rectifier shutdown. The shutdown source may be remote or local shutdown, AC shutdown, OVP or thermal shutdown.

When the rectifier is in this state the DC-DC converter is turned off and the CXC will be monitoring its inputs for the proper conditions to begin the start up sequence.

When the conditions have been met for the rectifier to start up, it will transition to the Start Delay state.

6.1.2 Start Delay State

When the rectifier is in the Start Delay state, the DC-DC converter is held off and still not sourcing power and is waiting for a given amount of time before transitioning to the next state.

When in this state, the CXC continues to monitor its inputs.

After the Start Delay state the rectifier will transition to the Soft Start state.

NOTE: *Soft start, or current walk-in, gradually increases the voltage and current output of the rectifier upon startup. This is done to reduce the instantaneous load on the AC source.*

6.1.3 Soft Start State

When the Soft Start state is entered, the rectifier will be turned on and the output voltage and output current will be gradually increased. If a load is present, the rectifier will begin to source power.

When the voltage and current limit ramps have finished, the rectifier will transition to the Normal Operation state.

6.1.4 Normal Operation State

The Normal Operation state is the state that the rectifier will be in performing all of the rectifier functions and features specified herein.

From this state, the only valid transition is to the Turning Off state. This transition will happen if the rectifier is required to shutdown.

6.1.5 Turning Off State

The Turning Off state is entered because a short delay is required before the rectifier actually turns off to take care of any initialization requirements.

When this short delay has elapsed, a transition to the Off state is made.

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6.2 Main Rectifier Modes

In addition to Main Rectifier States, there is a set of Main Rectifier Modes. These modes can be divided into two categories as follows:

6.2.1 Output Voltage Modes

Voltage modes can be thought of as modes that, under software control, can directly adjust the output voltage. The qualification of 'under software control' is made because there are processes that occur in the rectifier that can change the output voltage that do not adjust the output voltage directly (such as the rectifier being in current limit).

The following table lists the five Output Voltage Modes and a description of when they are active:

Output Voltage Modes	Active when…
Float	Output voltage is set to the float voltage setting.
Equalize	Output voltage is set to the equalize voltage setting.
Battery Test	Output voltage is set to the battery test voltage setting.
Safe	Output voltage is set to the safe mode voltage setting.
Manual Test	Output voltage can be manually adjusted outside of the standard adjustment ranges.

Table D–Output voltage modes

6.2.2 Output Current/Power Modes

These modes directly affect the output current and power.

The following table lists the four Output Current/Power Modes and a description of when they are active:

Output Current/Power Mode	Active when…
Temperature foldback mode	Output current and power limit have been reduced due to high temperature of the heatsink or internal ambient temperature sensor.
AC foldback mode	Output current and power limit have been reduced due to low AC input voltage. *Note: this will reduce the risk of tripping an AC breaker due to increased AC current draw as the AC voltage decreases.*
Short circuit foldback mode	Output current limit has been reduced due to a short circuit at the output.
Internal fault foldback mode	Output current limit has been reduced due to an internal fault.

Table E–Output current/power modes

6.3 Can Bus Communications

The CAN bus is used for communication between the rectifier and CXC.

The communication between the rectifier and CXC consists of commands and data transfer that are used during the operation of the power system to configure the rectifier with system settings and to monitor rectifier status.

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6.4 Factory Ranges and Defaults

The following table lists the rectifier settings/ranges/defaults; changes are made via the CXC:

Setting	Range (minimum to maximum)	Default
Float (FL) Voltage	90 – 160V	130.5V
Equalize (EQ) Voltage	90 – 160V	132.9V
Battery Test (BT) Voltage	90 – 160V	106.3V
OVP	See note below – 160V	137.8V
Current Limit (CL)	9 – 100%	100%
Power Limit (PL)	0 – 100%	100%
Module Start Delay	0 – 250s	1s
System Start Delay	0 – 600s	0s
Low Voltage Alarm (LVA)	90 – 160V	106.3V
High Voltage Alarm (HVA)	90 – 160V	134.1V
EQ Timeout	1 – 2399h	30h
BT Timeout	1 – 250h	8h
Softstart Ramp-rate	Normal/Fast	Normal
CL/PL Alarm	Enable/Disable	Enable
Remote Shutdown	Enable/Disable	Enable
Ramp Test	Enable/Disable	Enable

Table F–Cordex 125-1100W factory ranges and defaults

NOTE: *OVP cannot be set below the present system/FL/EQ/BT voltage setting or the safe mode voltage of 118.9V.*

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7 System Startup

After completing the shelf wiring and installation, perform the following startup and test procedure to ensure proper operation:

7.1 Check System Connections

- Ensure AC is off, battery is disconnected, and all power modules are removed from the shelf.
- Triple check the polarity of all connections.

7.2 Verify AC and Power the Shelf

- Install one power module.
- Verify AC input voltage is correct and turn on the corresponding AC input feeder breaker.
- The power module OK LED should illuminate after a preset start delay.
- Using the CXC, test functionality of various module alarms and controls.

7.3 Check Battery Polarity and Connect

- Verify correct battery polarity using a voltmeter (ensuring no cells or batteries are reversed).
- Connect battery as required to the output of the system or turn on battery breaker.
- Install remaining power modules.
- In the adjustments menu of the CXC (web browser), set Float and Equalize voltage to the levels specified by the battery manufacturer.
- Using the CXC, test functionality of various module alarms and controls. In addition, perform a load test with the system using a resistive load box as needed.

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8 Maintenance

Although very little maintenance is required with Argus systems, routine checks and adjustments are recommended to ensure optimum system performance. Qualified service personnel should do repairs.

The following table lists a few maintenance procedures for this system. These procedures should be performed at least once a year.

WARNING: HIGH VOLTAGE AND SHOCK HAZARD.

Use extreme care when working inside the shelf while the system is energized.
Do not make contact with live components or parts.

Circuit cards, including RAM chips, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.

Procedure	Date Completed
Clean ventilation openings	
Inspect all system connections (re-torque as necessary)	
Verify alarm/control settings	
Verify alarm relay operation	

Table G–Sample maintenance log

NOTE: *There are no field replaceable parts.*

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9 Argus Conventions

9.1 Numbering System

Argus Technologies uses an eight-digit drawing number system, which is broken into three blocks. The first three digits describe the category of the product; e.g., rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing, for example:

"-06" Outline Drawing
"-08" Customer Connections
"-20" Main Assembly

Argus uses an eight-digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity, categories will not be listed within this manual.

9.2 Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American wire gauge
BTU	British thermal unit
CAN	Controller area network
CEC	Canadian Electrical Code
CPU	Central processing unit
CSA	Canadian Standards Association
CX	Cordex™ series; e.g., CXC for Cordex System Controller
DC	Direct current
DIN	Deutsches Institut für Normung (in English, the German Institute for Standardization)
EFT	Electrical fast transient
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ERM	Electromagnetic compatibility and radio spectrum matters
ESD	Electrostatic discharge
FCC	Federal Communications Commission (for the USA)
HVSD	High voltage shutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
LCD	Liquid crystal display
LED	Light emitting diode
LVD	Low voltage disconnect
MTBF	Mean time between failures
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RAM	Random access memory
RU	Rack unit (1.75")
TCP/IP	Transmission control protocol / internet protocol
THD	Total harmonic distortion
UL	Underwriters Laboratories

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FACTORY SERVICE INFORMATION

Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free 7:30 am to 5:00 pm Pacific Standard Time at:

+1-888 GO ARGUS

(+1-888-462-7487)

For emergencies, call +1-888-GO-ARGUS 24 hours a day, seven days a week.
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

Training

Argus offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at ***www.argusdcpower.com***.

Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed to the right.

Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Argus factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. All material must be pre-authorized before being returned.
See document 048-507-10 "Warranty and Repair Information" for more details.

Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit.

Factory Service Centers

Canada and International
Argus Technologies Ltd.
ATTN: RMA Returns
7033 Antrim Avenue
Burnaby, BC, V5J 4M5 Canada
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Fax: +1 604 436 1233
Email: returns@argusdcpower.com

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Argus Technologies Inc.
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Fax: +1-360 647 0498
Email: returns-usa@argusdcpower.com

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Tel: +61 02 9602 8331
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E-pager: 541149939996@nextel.net.ar

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Yenisahra - Kadikoy
Istanbul, Turkey
Tel: +90 216 317 41 42
Fax: +90 216 472 90 66

048-527-10-I1 Rev L (09/2007)

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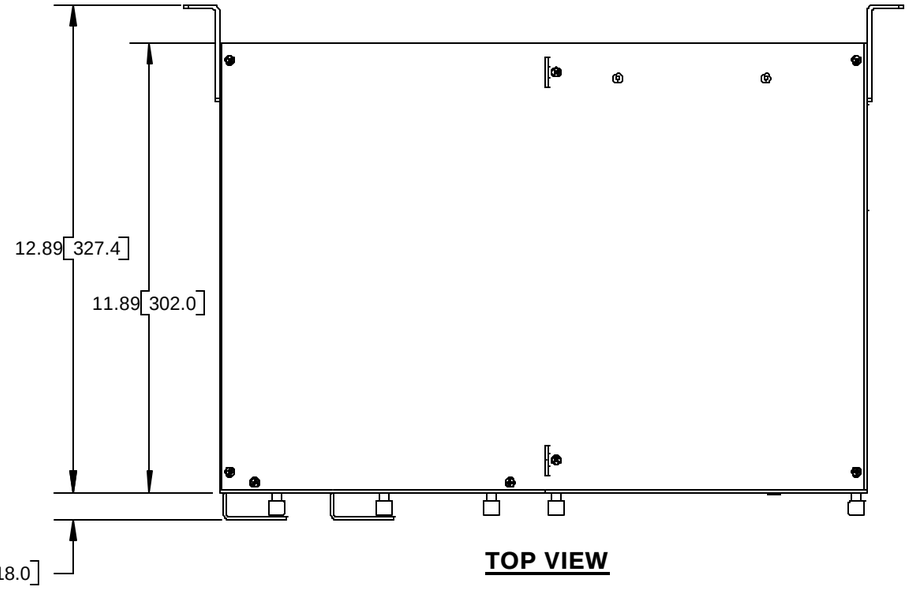
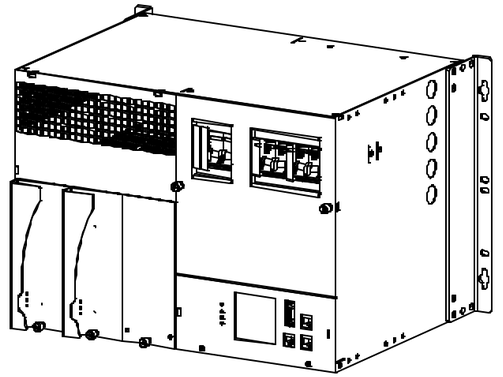


TOP VIEW

ISOMETRIC VIEWS



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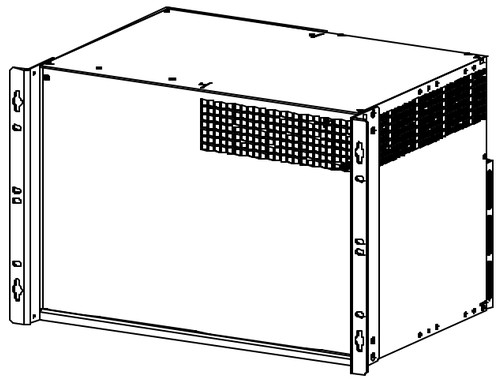

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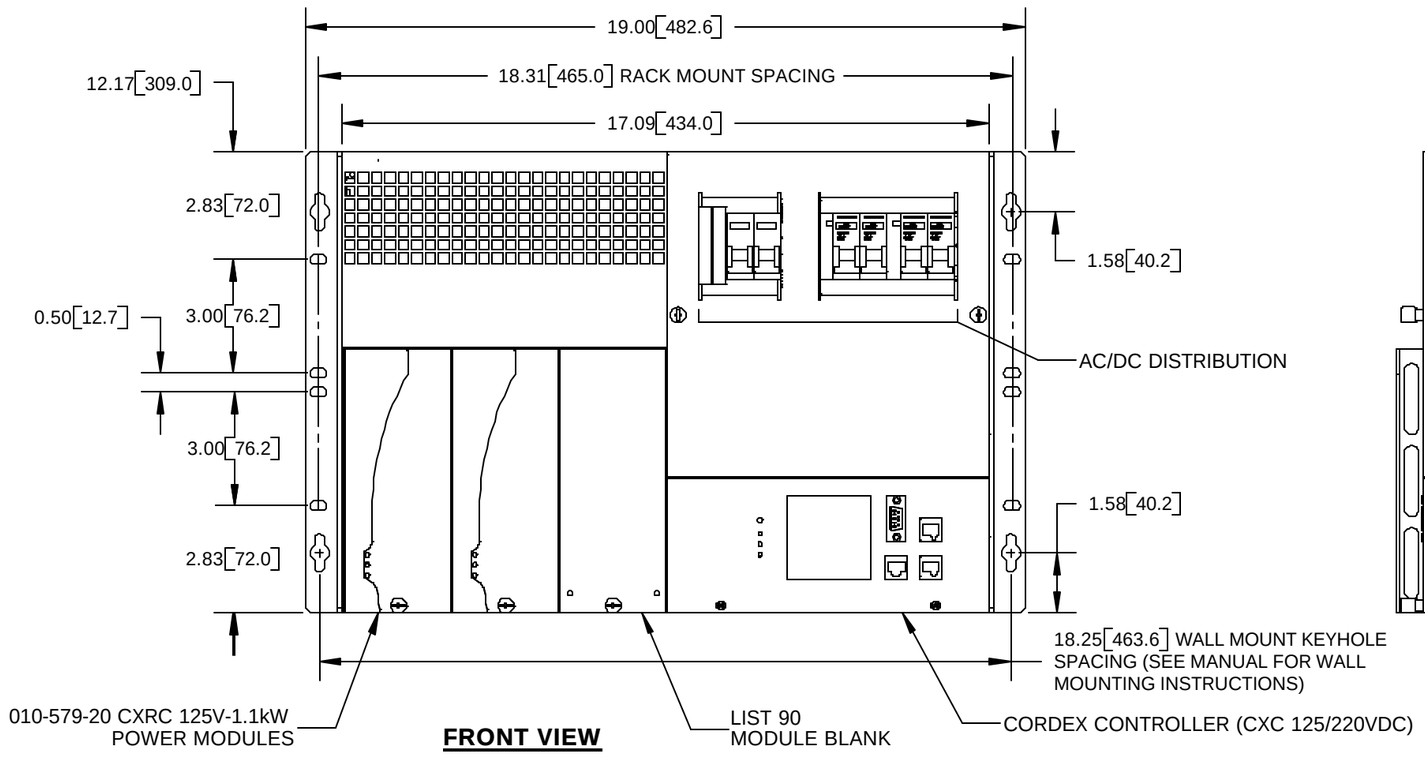
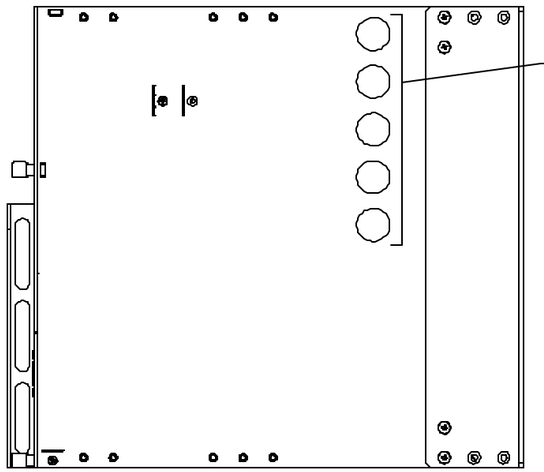


FRONT VIEW



SIDE VIEW

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DESIGN	RP	2006/06	MATERIAL
DRAWN	SDW	2006/07	
CHECKED	JK	2006/07	
APPROVED	GS	2006/07	FINISH

TOLERANCES

X.X	±0.04"	[X]	±1mm
X.XX	±0.02"	[X.X]	±0.5mm
X.XXX	±0.01"	[X.XX]	±0.25mm

SCALE NTS

TITLE

OUTLINE, 19" SHELF, 3xCXRC 125 1.1kW, CXC, DIST.

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ISSUE DATE

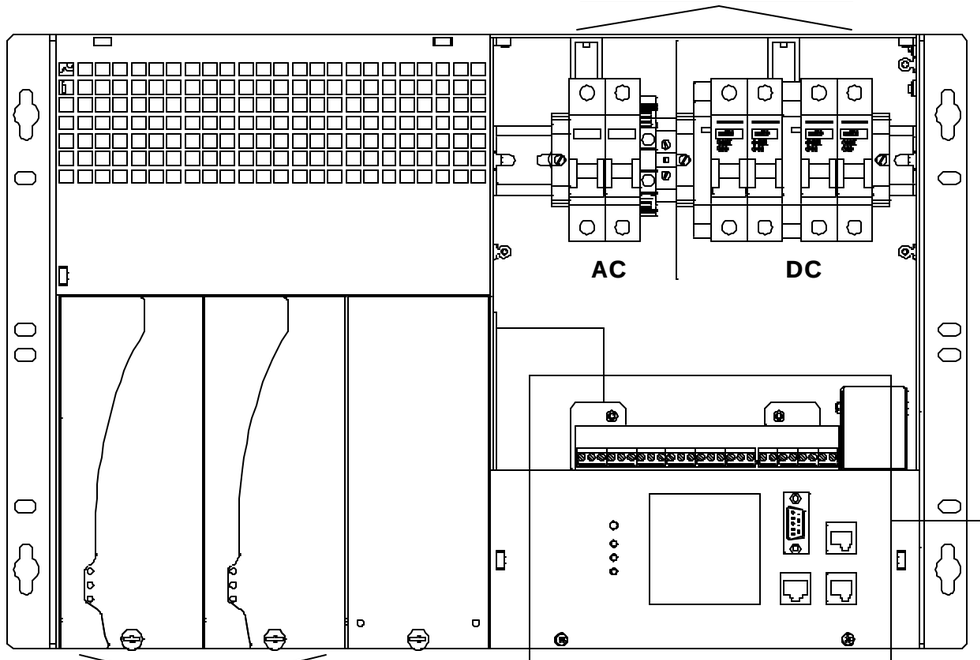
SHEET 1 OF 1

DIMENSIONS ARE IN INCHES WITH METRIC (mm) IN BRACKETS: INCHES [mm]

SIZE	TYPE	DWG NO.	REV
B	D2	030-788-06	A

REVISIONS				
LTR	DESCRIPTION	REV BY	DATE	APPD

AC/DC DISTRIBUTION



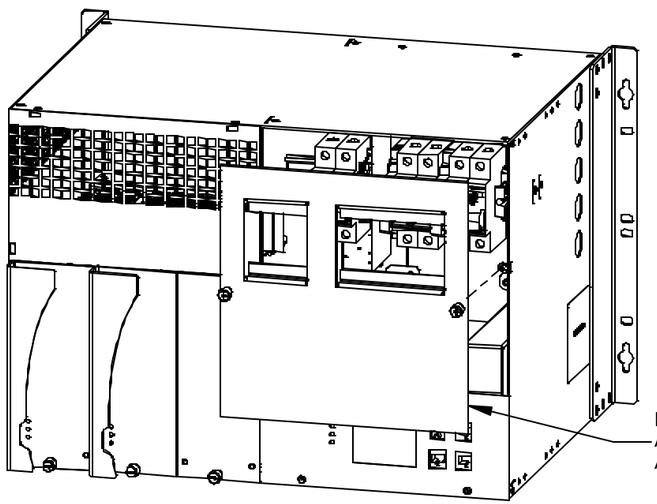
CORDEX 125-1.1kW MODULES

MODULE BLANK

CORDEX CONTROLLER (CXC 125/220VDC)

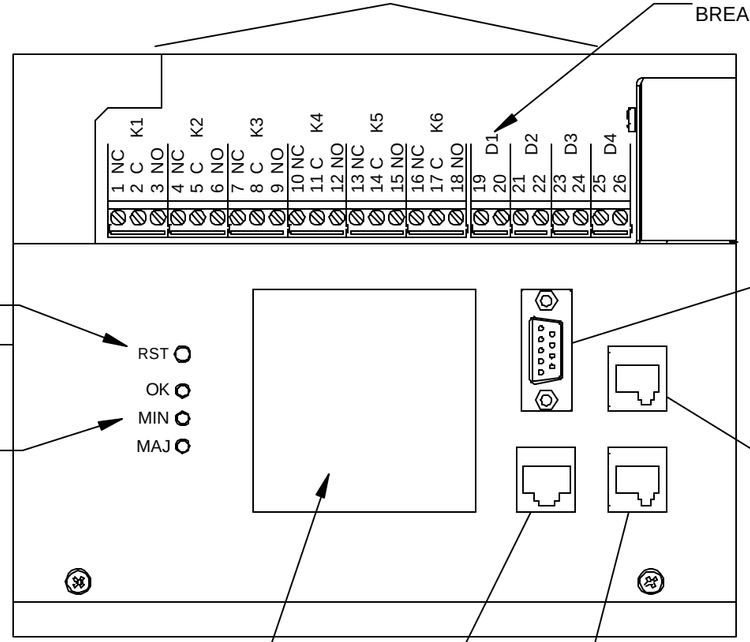
FRONT VIEW

(DISTRIBUTION FRONT PANEL REMOVED)



REMOVE DISTRIBUTION FRONT PANEL TO ACCESS CXC SIGNAL TERMINAL BLOCKS, AND DISTRIBUTION BREAKERS.

CXC SUPERVISORY CONNECTIONS



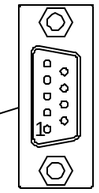
USED INTERNALLY FOR OUTPUT CIRCUIT BREAKER ALARMS

CXC RESET SWITCH

SYSTEM STATUS LEDS

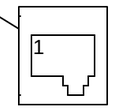
LCD TOUCHSCREEN

CRAFT PORT DB-9 PINOUT



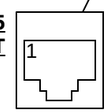
1. NOT CONNECTED
2. RXD
3. TXD
4. NOT CONNECTED
5. GND
6. NOT CONNECTED
7. NOT CONNECTED
8. NOT CONNECTED
9. NOT CONNECTED

RS-485 RJ-12 PINOUT



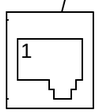
1. GND
2. RS485 **+**
3. RS485 **-**
4. RS485 **-**
5. RS 485 **+**
6. SCI EN

NETWORK RJ-45 PINOUT



1. TX **+**
2. TX **-**
3. RX **+**
4. NOT CONNECTED
5. NOT CONNECTED
6. RX **-**
7. NOT CONNECTED
8. NOT CONNECTED

CAN OUT RJ-12 PINOUT



1. CAN **COM**
2. CAN **H**
3. NOT CONNECTED
4. CAN **L**
5. NOT CONNECTED
6. NOT CONNECTED

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DESIGN	RP	2006/06	MATERIAL
DRAWN	SDW	2006/07	
CHECKED	JK	2006/07	
APPROVED	GS	2006/07	FINISH

TOLERANCES
X.X ±0.04" [X] ±1mm
X.XX ±0.02" [X.X] ±0.5mm
X.XXX ±0.01" [X.XX] ±0.25mm

SCALE NTS

TITLE
CUST CONNECTION, 19" SHELF, 3xCXRC 125-1.1kW CXC, DIST.

ISSUE DATE

SHEET 1 OF 3

SIZE	TYPE	DWG NO.	REV
B	D2	030-788-08	A

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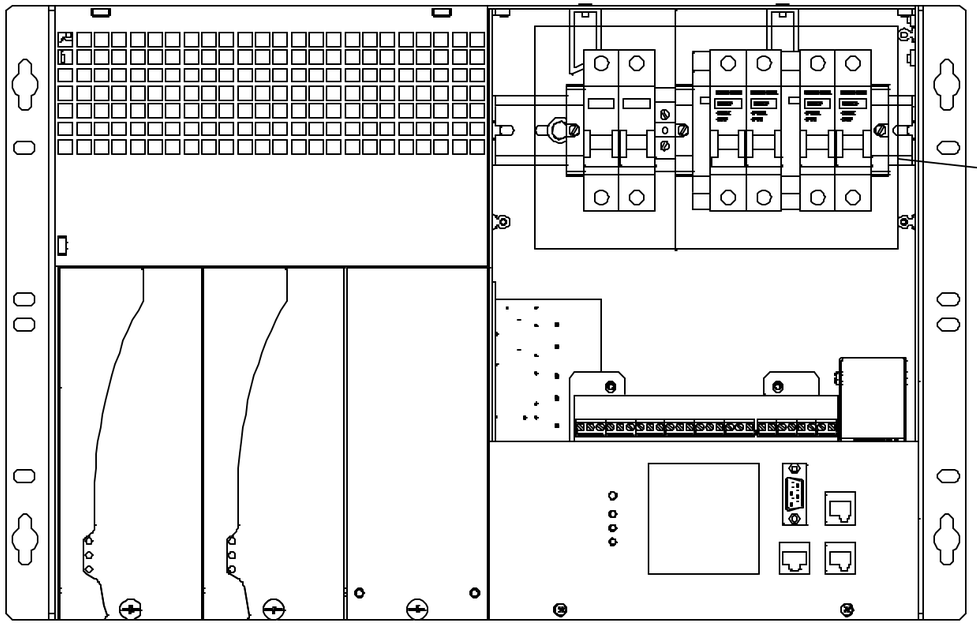
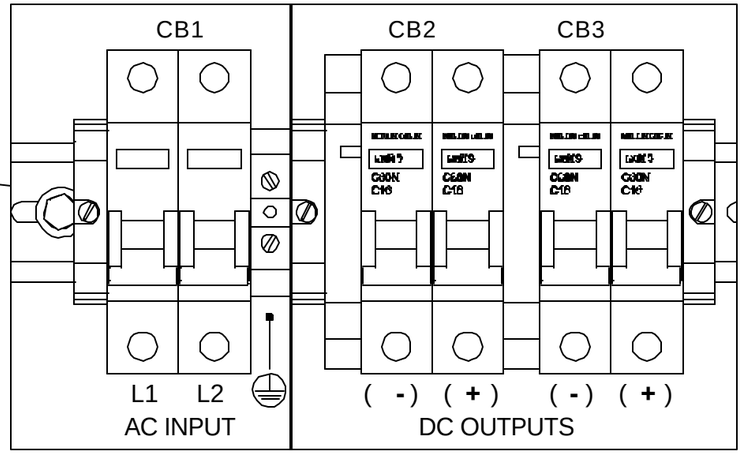
AC BREAKER DISTRIBUTION OPTIONS

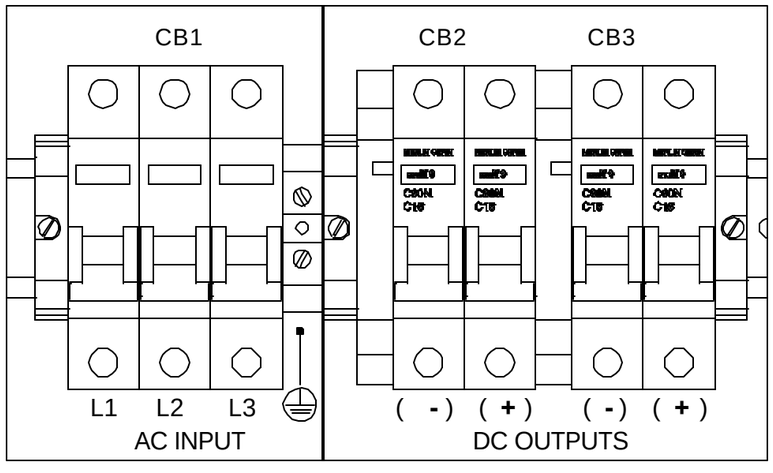
(SHOWN WITH 2x LIST 132 DC OUTPUT BREAKERS)





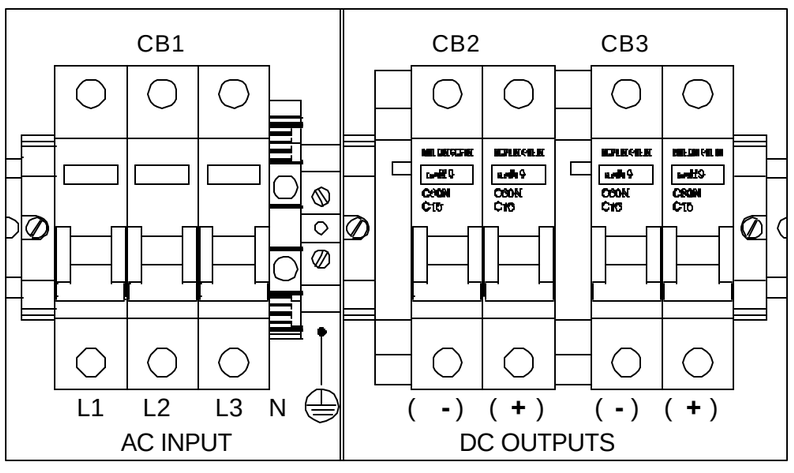
LIST 85 - 2 POLE AC BREAKER

(SINGLE PHASE CONNECTION)



LIST 83 - 3 POLE AC BREAKER

(3 PHASE DELTA CONNECTION)



LIST 84 - 3 POLE AC BREAKER

(3 PHASE WYE CONNECTION)

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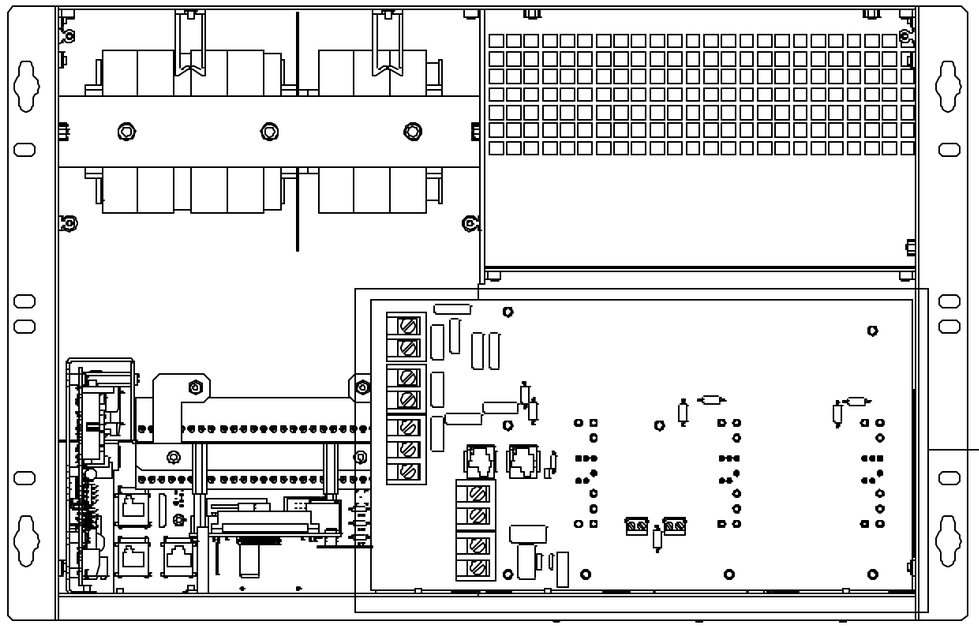
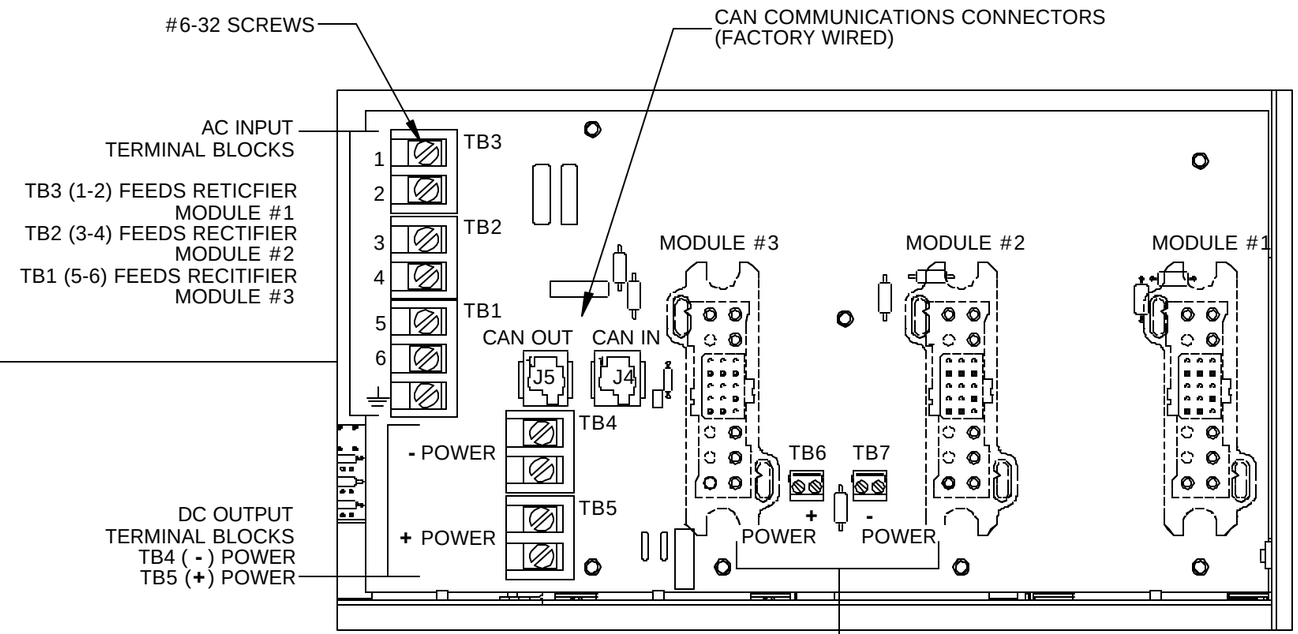
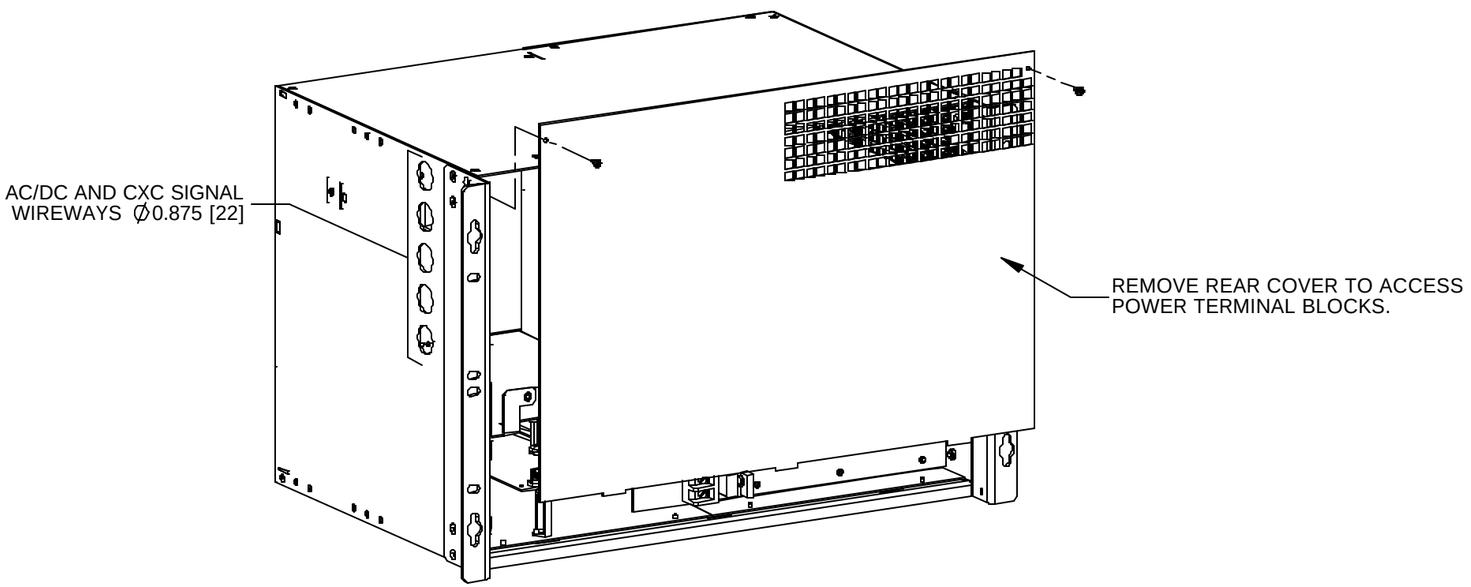
	SCALE NTS
TITLE	CUST CONNECTION, 19" SHELF, 3xCXRC 125-1.1kW CXC, DIST.
ISSUE DATE	SHEET 2 OF 3
SIZE B / TYPE D2 / DWG NO.	030-788-08 / REV A



REAR VIEW
(COVER REMOVED)





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SCALE NTS

TITLE
CUST CONNECTION, 19" SHELF,
3xCXRC 125-1.1kW CXC, DIST.

ISSUE DATE

SHEET 3 OF 3

SIZE	TYPE	DWG NO.	REV
B	D2	030-788-08	A